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कृत्रिम रेशों से निर्मित टायर सूत, डोरी और  
टायर डोरी कपड़ा — परीक्षण के तरीके

भाग 1 शब्दों की परिभाषा

(दूसरा पुनरीक्षण)

**Tyre Yarns, Cords and Tyre Cord  
Fabrics Made from Man-Made  
Fibres — Methods of Test**

**Part 1 Definition of Terms**

( Second Revision )

ICS 83.160 ; 59.060.01

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## FOREWORD

This Indian Standard (Part 1) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Technical Textiles for Mobiltech Applications Sectional Committee had been approved by the Textiles Division Council.

This standard was first published in 1970 and subsequently revised in 1989. The second revision has been made in the light of experience gained since its last revision and to incorporate the following major changes:

- a) The title of the standard has been modified; and
- b) The definitions of 'cord' and 'pneumatic splice' have been incorporated.

This standard has been published in various parts. The other parts under this series are:

- Part 2 Linear density
- Part 3 Load and elongation characteristics
- Part 4 Dip pick-up
- Part 5 Heat shrinkage and heat shrinkage force
- Part 6 Wet contraction and contractile force
- Part 7 Heat degradation
- Part 8 Thickness
- Part 9 Sampling of tyre yarns, cords and tyre cord fabrics made from rayon
- Part 10 Creep
- Part 11 Commercial mass
- Part 12 Sampling of tyre yarns, cords and tyre cord fabrics made from polyamide
- Part 13 Static Adhesion of textile tyre cord to vulcanized rubber

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'.



*Indian Standard***TYRE YARNS, CORDS AND TYRE CORD FABRICS MADE  
FROM MAN-MADE FIBRES — METHODS OF TEST****PART 1 DEFINITION OF TERMS***( Second Revision )***1 SCOPE**

This standard (Part 1) defines various terms used in the testing of tyre yarns, cords and tyre cord fabrics made from man-made fibres.

**2 DEFINITIONS****2.1 Adhesion**

The property of treated tyre yarns or cords by which they tend to adhere to the rubber. It is expressed in terms of force (N) for a fixed cord linear density or in force per unit width (N/25 mm or kN/m).

**2.2 Air Wicking**

The passage of air longitudinally along or through yarns in a fabric that has been encased and cured in rubber or other elastomer, that is, air permeability in the plane of the fabric.

**2.3 Bow**

The greatest distance measured parallel to the selvage, between a weft yarn and a straight line drawn between the points at which this yarn meets the selvage. Bow may be expressed directly in millimetres or as a percentage of the width of the fabric at that point.

**2.4 Breaking Load**

The maximum tensile force observed during a test in which the specimen is stretched until it breaks. It is commonly expressed in newtons, centinewtons or millinewtons.

**2.5 Commercial Moisture Regain**

The agreed value to be added to the mass of a defined material (after drying it using prescribed methods) in order to obtain its commercial mass, linear density, or mass per unit area. It is expressed as a percentage of the mass of the dried material.

**2.6 Condition**

To bring a sample or specimen to moisture equilibrium for testing.

**2.7 Construction**

The geometrical configuration of a cord.

**2.8 Cord**

A term applied loosely to a variety of textile strands including:

- a) Cabled yarns,
- b) Plied yarns used in tyres; and
- c) Structures made by plaiting or braiding for example, parachute cords, tyre cords etc.

**2.9 Creep**

The increase in length of a specimen caused by the application of a continuing load or force under specified conditions. Creep is usually expressed as a percentage of the initial specimen length.

**2.10 Denier**

A unit of yarn number which is numerically equal to the number of grams per 9 000 m of yarn.

**2.11 Dip**

A material applied to a textile to improve its adhesion to rubber.

**2.12 Dip Pick-Up**

The amount of dip present in the specimen. It is expressed as the percentage of mass of the oven-dry, dip-free specimen.

**2.13 Dipping**

The process of impregnating a textile material with a compound to improve its adhesion to rubber.



## 2.14 Elongation

The increase in length of a specimen during a tensile test expressed in units of length, for example, millimetres.

## 2.15 Elongation Percent

The increase in length of a specimen during a tensile test expressed as a percentage of the nominal gauge length.

NOTE — In a tensile test, the elongation percent is calculated on the basis of the nominal gauge length of pre-tensioned specimen.

## 2.16 Elongation at Break

The elongation produced by the breaking force (that is, the maximum force applied during the determination of breaking strength).

## 2.17 Elongation at Specified Load, Percent

The increase in length of a specimen at a certain desired load during a tensile test, expressed as a percentage of the nominal gauge length.

## 2.18 Ends

Warp threads, usually of tyre cord. The ends per decimetre are the number of cords per decimetre of width.

## 2.19 Filament

Elementary continuous constituent of yarn.

## 2.20 Filament Yarn

A yarn composed of continuous filament assembled with or without twist.

## 2.21 Finish

- a) Verb — the process of impregnating yarns with a substance to facilitate further processing; and
- b) Noun — the substance used for finishing.

## 2.22 Heat Degradation

The drop in breaking load of tyre yarn or cord on exposure to an elevated temperature for a predetermined time. It is expressed as a percentage of breaking load of the conditioned specimen.

## 2.23 Heat Shrinkage

The maximum decrease in length of yarn or cord when exposed to an elevated temperature under a

pre-tension, it is expressed as a percentage of the nominal gauge length.

## 2.24 Heat Shrinkage Force

The maximum force developed in the yarn or cord of fixed length when exposed to an elevated temperature. It is expressed as force per unit linear density g/tex or g/denier.

## 2.25 Industrial Yarn

A yarn usually of high tenacity, produced with or without twist and intended for applications in which functional properties are of primary importance; for example, in reinforcing material in polymeric products (tyres, belting hoses), protective coverings, ropes, nets, twines, filters and sail-cloths.

## 2.26 Linear Density

The mass per unit length. It is expressed in tex or its multiples or sub-multiples.

## 2.27 Load at Specified Elongation

The load or force required to produce a specified or pre-determined percentage elongation of a tyre yarn or cord. It is expressed in newtons.

## 2.28 Mass

### a) Gross mass

The total mass of a consignment, case, roll or sample, including the mass of packing materials, containers and of supports, such as, cones and bobbins and shell rolls.

### b) Tare mass

The mass of all external and internal packing materials of a case, roll or other type of containers including the mass of bobbins, tubes, etc.

### c) Net mass

The difference between the gross mass and the tare mass determined at the same time.

### d) Oven dry mass

The mass of a sample of textile material dried to substantially constant mass in an oven maintained at  $(105 \pm 3)^\circ\text{C}$  and supplied with air at standard atmospheric conditions  $[(65 \pm 2)$  percent relative humidity and  $(27 \pm 2)^\circ\text{C}$  temperature].



## e) Commercial mass

- 1) For undipped yarns and cords, the sum of oven-dry mass and the mass corresponding to the commercial moisture regain.
- 2) For dipped cords, the sum of oven-dry mass and the mass corresponding to commercial moisture regain for the textile plus an increase for dipping.

## f) Invoiced mass

The mass used for billing.

## 2.29 Moisture Equilibrium

The condition reached by a sample at a closely defined temperature and relative humidity when the net difference between the amount of moisture absorbed and the amount desorbed as indicated by a change in mass, shows no trend and becomes insignificant.

## 2.30 Moisture Equilibrium for Testing

A textile material is in moisture equilibrium with the ambient atmosphere when it does not exchange water with this atmosphere; its mass then remains constant as long as the experiment is carried out in an unchanged atmosphere. For test purposes, moisture equilibrium must be reached by absorption starting from a relatively low moisture content.

## 2.31 Moisture Regain

The amount of moisture in a specimen determined under prescribed conditions, and expressed as the percentage of oven dry mass of the specimen

## 2.32 Monofilament

A single filament with or without twist.

## 2.33 Nominal Gauge Length

The length of a specimen under specified pretension, measured from nip to nip of the jaws of the holding clamps in their starting positions.

## 2.34 Package

A length or lengths of yarn in a form suitable for use, handling, storing or shipping. Packages may be unsupported, such as, balls, skeins or cakes or supported, such as, beams, bobbins, cops, cones, pirns, spools or tubes.

## 2.35 Plying

The operation of assembling two or more single yarns of the same length maintained under same tension.

## 2.36 Pre-Tension

The initial force applied to remove kinks and crimp when preparing a specimen for test, and used to establish the nominal gauge length.

## 2.37 Selvage

The woven edge portion of a fabric parallel to the warp. It may be of similar construction as the body of the fabric or differ from it in construction, weave or end spacing.

NOTE — Closed selvages usually have an increased warp end density at the edges than in the body of the fabric; cut (leno) selvages are usually formed by weaving with projectile weaving machines. The leno ends are to prevent the selvage ends from falling out of the fabric after the picks have been cut; and auxiliary selvage is necessary until the weft has been cut.

## 2.38 Splice

The joining of two ends of yarn or cord.

### a) Sewn splice

The term used for sewn joints in tyre cord trade. This is made by applying a zig-zag stitch on two cord ends lying side by side (*see* Fig. 1).

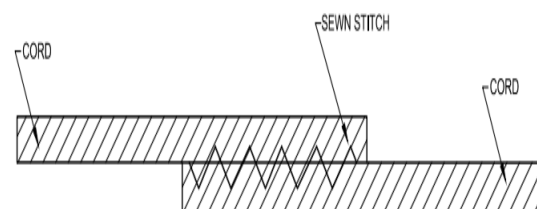


FIG. 1 SEWN SPLICE

### b) Pneumatic splice

A splice is made by placing two yarns into a pneumatic splicer, in a flat 'X' arrangement. An air blast intermingles the fibres, and integral cutters trim off the waste ends. The completed splice is then withdrawn.



### 2.39 Tab (or Header)

Closely woven end portions of a tyre cord roll.

### 2.40 Tabby

A full-width sample of tyre cord, usually 1 m long, with two tabs at its ends to enable its removal from the roll.

### 2.41 Tenacity

The ratio of breaking load to the linear density of the unstrained specimen, usually expressed in centinewtons per tex (cN/tex).

### 2.42 Tex

The primary unit in a system of units expressing the universal count of yarn (*see Note*); the mass in grams of one kilometre of yarn.

NOTE — This system is also intended to be used for expressing the mass per unit length of fibres and other textile products, such as, ropes and rovings. The following multiple and submultiples units may be used to avoid large numbers and small fractions, respectively:

1 ktex (kilotex) = 1 000 tex  
1 mtex (millitex) = 0.001 tex

### 2.43 Thickness

The distance between the upper and lower surface of a textile measured under a specified pressure; for tyre cords, this is measured as the average thickness of a group of parallel tyre cords.

### 2.44 Twist

- a) The number of turns about its axis per unit of length existing in a yarn based on the nominal gauge length before untwisting. It is usually expressed in turns per metre (turns/m). It may also be expressed as turns per centimetre (turns/cm).

b) Cord Twist

The amount of twist in a cord made from two or more single yarns, it is based on the initial length of a cord specimen and is usually expressed in turns per metre.

### c) 'S' Twist

The twist in yarn due to which its spirals are in line with the central portion of the letter S, when the yarn is held in a vertical position (*see Fig. 2*).

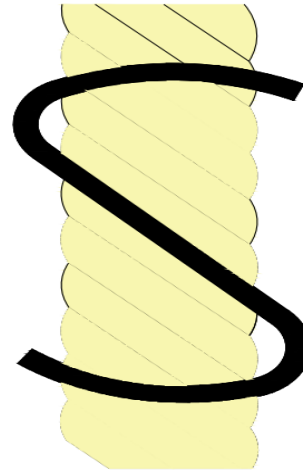


FIG. 2 'S' TWIST

### d) 'Z' Twist

The twist in yarn due to which its spirals are in line with the central portion of the letter 'Z' when the yarn is held in a vertical position (*see Fig. 3*).

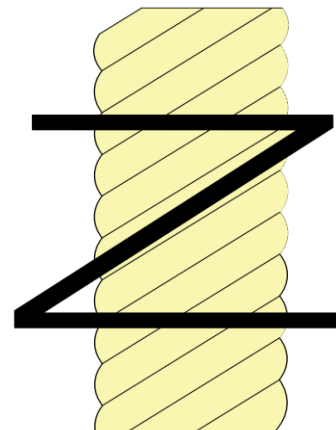


FIG. 3 'Z' TWIST



**2.45 Tyre Cord**

A particular construction of filaments or fibres of cotton, rayon, polyamide, polyester, or other suitable fibres, used as the structural reinforcement of pneumatic tyres.

**2.46 Tyre Cord Fabric (Warpsheet)**

A planar textile structure consisting of tyre cord warp with widely spaced weft threads. The latter merely serve to hold the cord in position for processing.

**2.47 Wet Contractile Force**

The maximum force developed in yarn or cord of fixed length when immersed in water. It is expressed as force per unit linear density (Newton/tex).

**2.48 Yarn**

A continuous strand of textile fibres or filaments with or without twist, suitable for plying, knitting, braiding, weaving or otherwise intertwining to form a textile and product. Varieties include single yarn, plied yarn, cabled yarn cord, thread, fancy yarn, etc.



**ANNEX A**  
(Foreword)

**COMMITTEE COMPOSITION**

Technical Textiles for Mobiltech Sectional Committee, TXD 38

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